Exam: Function Reflections (Solution version 7)

1. Let function f be defined by the polynomial below:

$$f(x) \;=\; 4x^5 + 8x^4 + 5x^3 - 3x^2 + 9x + 6$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials

$-f(x)$ •

$f(-x)$ •

$-f(-x)$ •

• $4x^5 - 8x^4 + 5x^3 + 3x^2 + 9x - 6$

• $-4x^5 - 8x^4 - 5x^3 + 3x^2 - 9x - 6$

• $-4x^5 + 8x^4 - 5x^3 - 3x^2 - 9x + 6$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.

- $y = g(x)$
- $y = -g(x)$

- $y = h(x)$
- $y = h(-x)$

- $y = m(x)$
- $y = m^{-1}(x)$

- $y = p(x)$
- $y = -p(-x)$
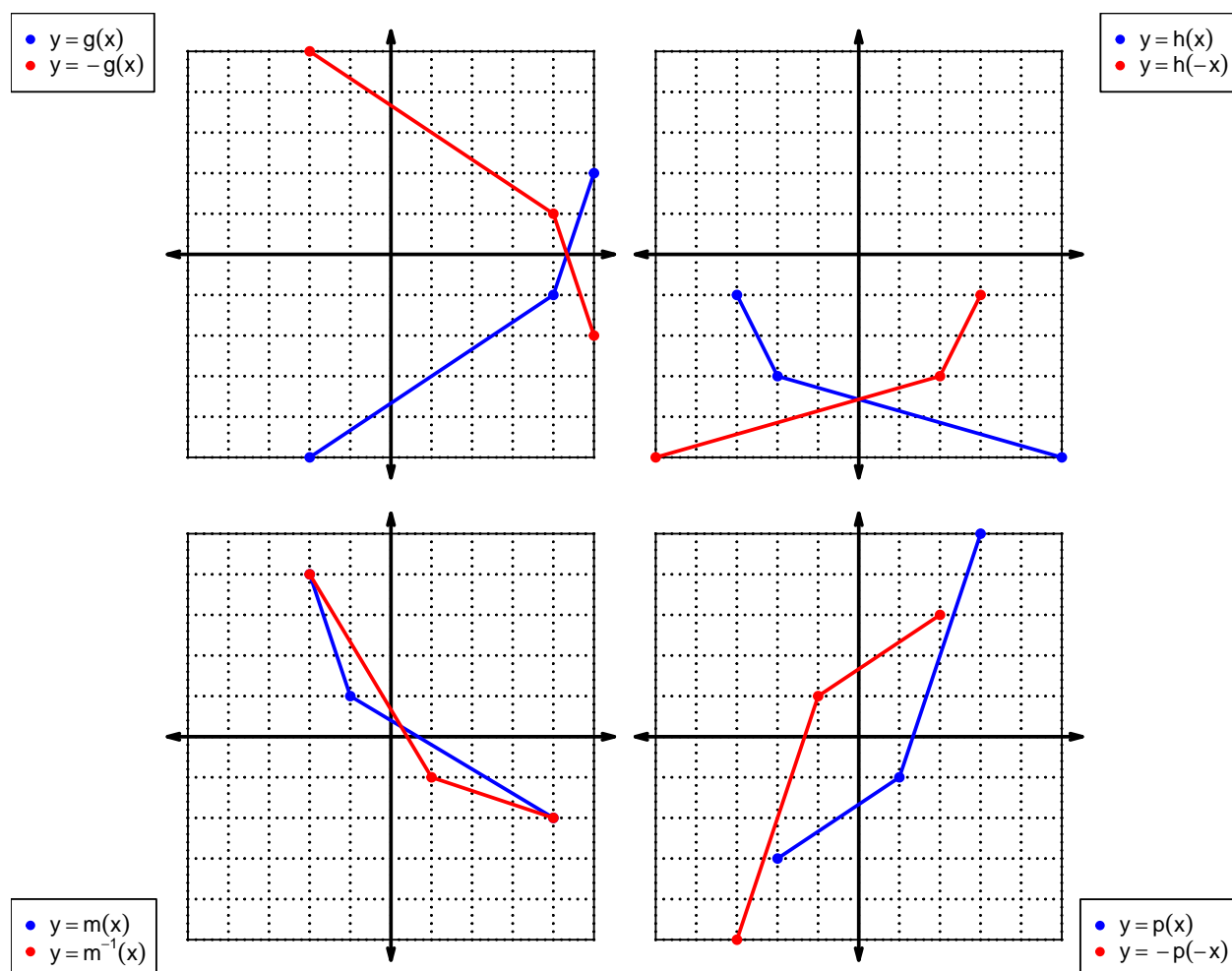
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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	9	5	6
2	7	8	9
3	5	3	8
4	6	1	2
5	2	9	7
6	8	6	3
7	1	4	5
8	4	7	1
9	3	2	4

3. Evaluate $f(4)$.

$$f(4) = 6$$

4. Evaluate $g^{-1}(5)$.

$$g^{-1}(5) = 1$$

5. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-8)$?

If function h is odd, then
$$h(-8) = -1$$

6. By filling more rows of the table, it is possible to make function g **even**. If that were done, what would be the value of $g(-9)$?

If function g is even, then
$$g(-9) = 2$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.

   Let polynomial p be defined with the following equation:

   $$p(x) \ = \ -x^2 - x$$

   a. Express $p(-x)$ as a polynomial in standard form.

   $$p(-x) \ = \ -(-x)^2 - (-x)$$
   $$p(-x) \ = \ -x^2 + x$$

   b. Express $-p(-x)$ as a polynomial in standard form.

   $$-p(-x) \ = \ -\left(-x^2 + x\right)$$
   $$-p(-x) \ = \ x^2 - x$$

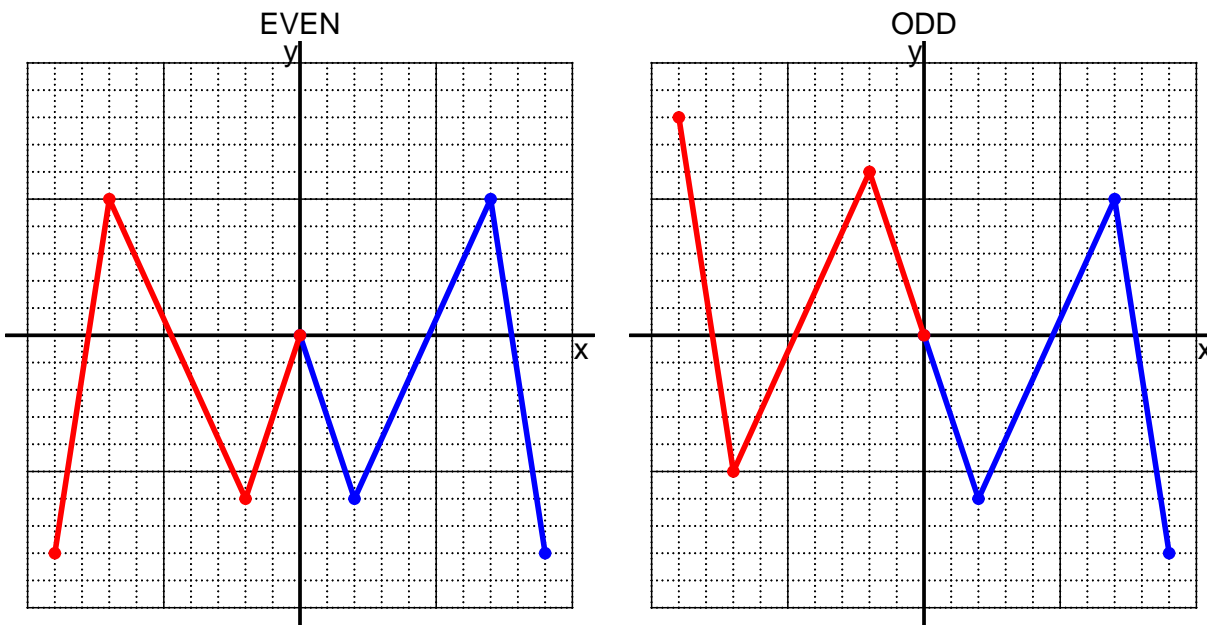   c. Is polynomial p even, odd, or neither?

   neither

   d. Explain how you know the answer to part c.

   We see that $p(x)$ is not equivalent to either $p(-x)$ or $-p(-x)$, so p is neither even nor odd.

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8. I have drawn half of a function. Draw the other half to make it even or odd.

EVEN

ODD

9. Let function f be defined with the equation below.

$$f(x) = 9(x + 2)$$

a. Evaluate $f(6)$.

step 1: add 2
step 2: multiply by 9

$$f(6) = 9((6) + 2)$$
$$f(6) = 72$$

b. Evaluate $f^{-1}(81)$.

step 1: divide by 9
step 2: subtract 2
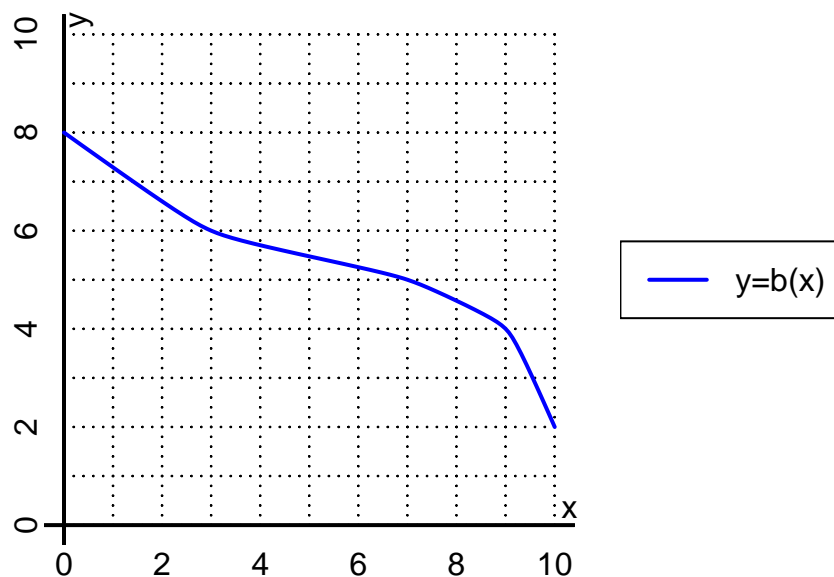
$$f^{-1}(x) = \frac{x}{9} - 2$$
$$f^{-1}(81) = \frac{(81)}{9} - 2$$
$$f^{-1}(81) = 7$$

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10. The function b is represented by the curve $y = b(x)$ graphed below.

a. Evaluate $b(3)$.

$$b(3) \;=\; 6$$

b. Evaluate $b^{-1}(5)$.

$$b^{-1}(5) \;=\; 7$$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-4	4	4	-4
-1	8	-8	-8	8
0	0	0	0	0
1	-8	8	8	-8
2	4	-4	-4	4

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.